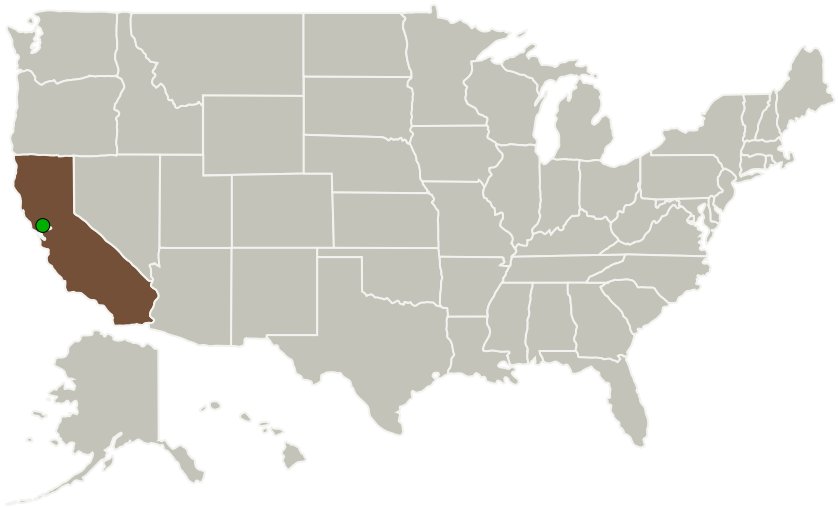
Petal Brake Hypersonic Entry System, Phase I

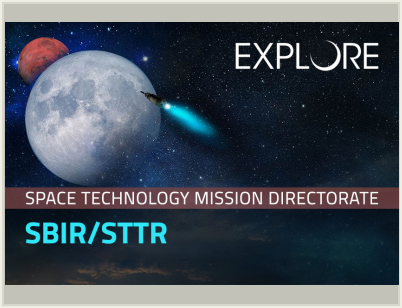
Completed Technology Project (2011 - 2011)

Project Introduction

Future NASA exploration plans will realize significant performance advantages with aerocapture and aerobraking of large, heavy payloads for Mars, Titan, and the gas giant planets. During a previous NASA LaRC funded High Mass Mars Entry System study, Andrews Space found that while inflatable aerobrake designs potentially offer the lowest-mass solution, they are challenged from the uncertainties of dynamic response of large soft structures at the sizes required, and from the risks associated with cleanly separating the lander/payload from the decelerator. A "Petal Brake" concept was introduced as an integrated hypersonic entry system design that addresses these issues. The design performs hypersonic aerocapture and entry maneuvers as a biconic aeroshell, then deploys to provide higher drag just prior to terminal descent and landing. It covers a wide range of EDL environments, is structurally determinate, with minimal aero-elastic issues, and with positive separation characteristics during jettison. During Phase I of this project, Andrews proposes to further advance the operational Petal Brake concept by designing and evaluating a point-of-departure petal-brake design for Mars entry, defining a potential test program, then generating a detailed subscale petal-brake design suitable for manufacture, wind tunnel testing, and high altitude deployment testing in Phase II.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Andrews Space, Inc.	Lead Organization	Industry	Tukwila, Washington
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138401)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Andrews Space, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

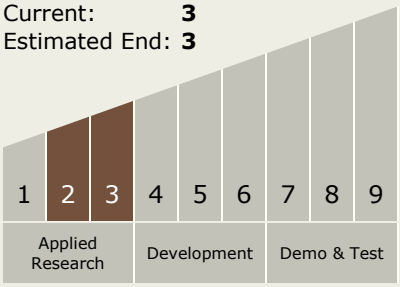
Carlos Torrez

Principal Investigator:

Jeffrey J Cannon

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.2 Descent
    - TX09.2.1 Aerodynamic Decelerators

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System